

What is claimed is:

1. A four-cycle combustion engine which comprises:

a valve operating mechanism including a valve drive unit mounted on a cylinder head for driving intake and exhaust valves, and a drive transmitting unit for transmitting a rotary drive of a crankshaft, drivingly coupled with a piston, to the valve drive unit;

a valve chamber accommodating therein the valve drive unit and communicated with an intake port capable of being selectively opened or closed by the intake valve;

an intake passage for introducing into the valve chamber an air-fuel mixture containing lubricant oil;

a first passage accommodating therein the drive transmitting unit and communicating between the valve chamber and a crankcase chamber; and

a second passage communicating between the crankcase chamber and the valve chamber;

wherein said valve chamber, said first passage, said crankcase chamber and said second passage cooperate with each other to define a circulating passage through which a portion of the air-fuel mixture from the intake passage is circulated as a result of a reciprocating motion of the piston.

2. The four-cycle combustion engine as claimed in Claim 1, further comprising a check valve for controlling a direction of flow of the air-fuel mixture within the circulating passage.

3. The four-cycle combustion engine as claimed in Claim 1, wherein the valve chamber is defined by a rocker cover mounted atop the cylinder head and further comprising an air-fuel mixture producing device disposed in the intake passage and arranged at a location laterally of the rocker cover.

4. The four-cycle combustion engine as claimed in Claim 1, wherein the air-fuel mixture circulates in the circulating passage in one direction from the

valve chamber back to the valve chamber through the first passage, then through the crankcase chamber and finally through the second chamber.

5. The four-cycle combustion engine as claimed in Claim 4, further comprising at least one of a first check valve disposed at a junction between the first passage and the crankcase chamber for allowing a flow of the air-fuel mixture only in one direction from the first passage towards the crankcase chamber, and a second check valve disposed at a junction between the second passage and the crankcase chamber for allowing a flow of the air-fuel mixture only in one direction from the crankcase chamber towards the second passage.

6. The four-cycle combustion engine as claimed in Claim 1, wherein the air-fuel mixture circulates in the circulating passage in one direction from the valve chamber back to the valve chamber through the second passage, then through the crankcase chamber and finally through the first passage.

7. The four-cycle combustion engine as claimed in Claim 6, further comprising at least one of a first check valve disposed at a junction between the second passage and the crankcase chamber for allowing a flow of the air-fuel mixture only in one direction from the second passage towards the crankcase chamber, and a second check valve disposed at a junction between the first passage and the crankcase chamber for allowing a flow of the air-fuel mixture only in one direction from the crankcase chamber towards the first passage.

8. The four-cycle combustion engine as claimed in Claim 6, wherein the second passage is fluid connected between the crankcase chamber and a portion of the valve chamber remote from an intake mouth opening to the valve chamber for introducing the air-fuel mixture from the intake passage into the valve chamber.

9. The four-cycle combustion engine as claimed in Claim 1, wherein an inlet port is defined in a cylinder block, said inlet port being in communication with the crankcase chamber and capable of being selectively opened or closed by the piston reciprocatingly moving within the cylinder block, wherein the second

passage is fluid connected between the valve chamber and the inlet port, and wherein the air-fuel mixture circulates in the circulating passage in one direction from the valve chamber back to the valve chamber through the second passage, then through the crankcase chamber and finally through the first passage.

10. The four-cycle combustion engine as claimed in Claim 9, further comprising a check valve disposed at a junction between the first passage and the crankcase chamber for allowing a flow of the air-fuel mixture from the crankcase chamber towards the first passage.

11. The four-cycle combustion engine as claimed in Claim 9, wherein the second passage is fluid connected between the crankcase chamber and a portion of the valve chamber remote from an intake mouth opening to the valve chamber for introducing the air-fuel mixture from the intake passage into the valve chamber.